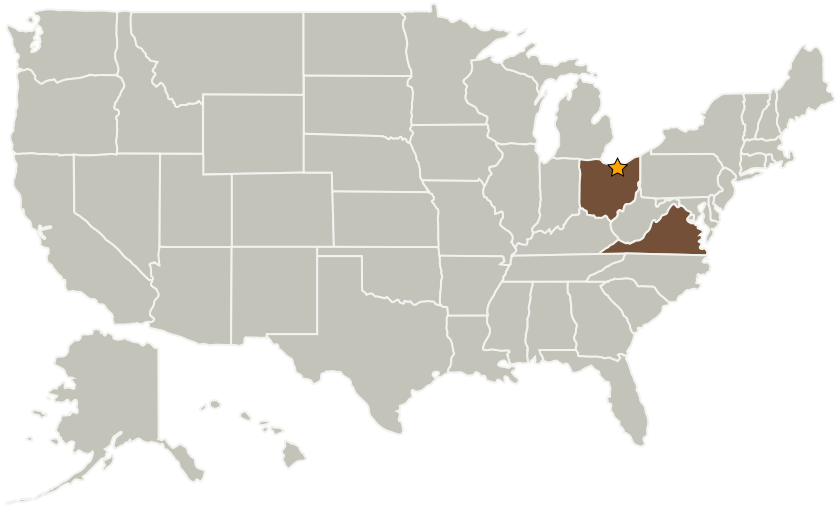
Autonomous Control of Space Nuclear Reactors, Phase II

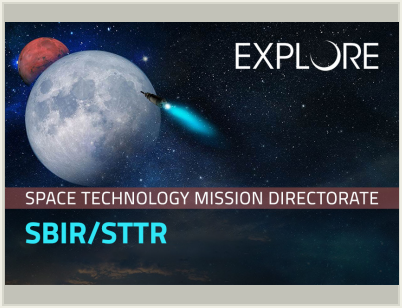
Completed Technology Project (2009 - 2012)

Project Introduction

Nuclear reactors to support future robotic and manned missions impose new and innovative technological requirements for their control and protection instrumentation. Long duration surface missions necessitate reliable autonomous operation, and manned missions impose added requirements for fail-safe reactor protection. There is a need for an advanced instrumentation and control system for space-nuclear reactors that addresses both aspects of autonomous operation and safety. Highly reliable, earth-based reactor instrumentation systems can provide an excellent reference for space-based designs, however there is currently no earth-based reactor control system that is practical for use in space. In Phase I, we established the feasibility of adapting proven terrestrial reactor instrumentation for space application, and developed a preliminary architecture on which to base a flight system. This Phase II will result in a complete detailed design for a space-based Reactor Instrumentation and Control System (RICS), including fabrication and testing of a ground-based prototype for system evaluation. Additionally, we will leverage existing neutron detection technology developed under a previous NASA contract, and optimized for the space environment. This Wide Range Neutron Detector (WRND), in conjunction with the proposed RICS, will provide a complete solution for autonomous operation of space reactors from hundreds of watts to multi-megawatts.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Aurora Flight Sciences Corporation	Supporting Organization	Industry	Cambridge, Massachusetts

Primary U.S. Work Locations	
Ohio	Virginia

Project Transitions

February 2009: Project Start

September 2012: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage